the way to their outfall, the foul-air ducts need not rise all the way to the open air, as Tredgold recommended (who, in his "Warming and Ventilating," edn. 1836, advocated these identical principles, though not to their full extent). They need not even rise at all, after leaving the ceiling; for the fluid to be got rid of being elastic, and quite filling them, the current entering them will always, whatever their shape, expel an equal current at the final outlet, provided it do not face the wind; which is to be avoided by making them open at both ends through two opposite external walls, so that one outlet may always be to leewards and effective. Further, there is even an advantage in the foul air cooling and sinking a little, after flowing out of the ceiling vents, as this ensures its not re-entering them.

5. Vents must be much nearer together than the sinks meant to drain water from a roof or terrace, because the water retains its motive power, its gravity, so long that there is no *haste* about getting it away (only provided it have not time to overflow its channels, as at the "Crystal Palace!"); but the foul air loses all its upward tendency before many seconds; so that it must not be played with nor have far to go, at least before getting through the ceiling,—after which it ought to be safely prevented from returning. Moreover, in domestic rooms, unless the vents be numerous, so that the slopes may be short, they could not have an ascent proportioned to their length without giving the whole ceiling a wasteful height. By having a vent, say, to every square foot, the base of the longest slope will not exceed 9 inches; so that the slope may be 1 to 1, and yet the extreme differences of level be included in the depth of ordinary joists.

We see, then, that for sanitary innocence—all apartments must be ceiled (unless the purpose be such as to admit openings in the roof, as in Moorish baths); that the ceiling must consist of one or more pyramidal (or still better, *domical*) cavities (the reason for a domical slope has been shown above—"Resemblances 3"); and that in domestic rooms these must be so numerous as not generally to exceed a square foot in area each. Of course, we may make them in plastered lath, like our present fever-holders, or in any other material; but I believe they will ultimately be made cheapest in *pottery*, and each in one piece. They may be of any quality, from brick to porcelain; remembering that a glaze to diminish friction, though not imperative, is to have precedence of all ornament; *i. e.* not lawfully to be omitted where there is *any* ornament. To fit between the joists, they must be of a square based dome shape, in section like a pointed arch; and their vent, if single, may rise as near to the flooring above, as half the width of its aperture; indeed, *should* do so, that the outflowing current may be immediately spread laterally, and not return. Hence, where there is no floor above, it would be better (and where there is one, it would save a little height) to have four vents, sloping outwards, from *close* to the internal apex; and they should be nostril-shaped; every care being requisite to conduct the foul fluid, without the smallest obstruction or lodgment, from its first touching the ceiling anywhere, till its safe passage through it. Any lodging-place for it will retain, cool, and send down, like our present ceilings, a constant supply of the poison. Hence the joists, dividing one row of these pots from another, must have their under face bevelled off each way, like the cut-waters of a bridge; and similar cut-currents must be formed by the bars (of whatever material) laid across from joist to joist, to receive the edges of the pots (and which will also perform the function of our present stretting). A little mortar thrown into the trenches above these junctions will make them tight against the downward return of cooled foul air.

The final outlets (for summer) must be between every two joists, in every wall, external or internal, that receives them; and their collected area must *at least* exceed twice that of all the ceiling vents, because one-half must always be supposed stopped by the wind; and the larger they are the better, because the only available motive power to expel the air through them, is the current through the ceiling vents, produced by the heat generated in the body, and communicated to the breath *for this purpose*. If we economise this heat *to save fuel* (as we do in all present buildings), of course we must use fire-heat (or steam power derived from it) to *ventilate*, i. e. to be the expensive substitute for the natural action we have prevented (and which I have shown our artificial ventilation cannot replace); so that we pervert both sources of heat to unnatural and forced use; nature having designed the *breath*-heat to carry breath out of our way, and bring us fresh air in its place; and the *fire* to warm us when necessary, which uses our ventilationists contrive to transpose. Moreover, as it is absurd to fancy the masses of mankind ever will, between this and doomsday, have *artificial* (i. e. *forced*) ventilation, the question for them lies simply between the natural ventilation (not that, nor (as at present) no ventilation, but) the natural, if encouraged enough for the purpose of warmth, mixed with the foul air may serve instead of. It is simply whether, having obtained *nearly* all the heat we need in winter, by consumption of wood or coal, we will have the remainder also at the expense of wood and coal, or of human flesh and blood.

An innocently constructed place, then, will (*cæteris paribus*) require rather more fuel to warm it (with the same apparatus) than one with a chance or fancy ceiling does; and will need a fire on some days when we do not need it at present. This must not be confounded with the nuisance of cold draught descending through the ceiling vents, which is quite another thing, never necessary, but which will always be liable to happen with any *real* vents (i.e. with any whose action is not defeated by some of the many contrivances for quieting sanitary concience by a sham ventilator,—a demonstrable hole to the open air, but through which nothing can pass). I say it may always happen with effective outlets, if either *they* be too large, or the inlets of fresh air about the floor (which in private buildings will hardly ever need special provision) be smaller in collective area than the vents, so that their deficiency is made up by indraught through the latter. This latter cause, then, may be always provided against; and if, when the architect has done so, the evil should still occur (in summer, for I am not speaking yet of the sanitation of *warmed* rooms),—then the ceiling-vents (not any others) are over large, and must be *each* reduced. Thus a few experiments may be necessary at first to determine the right size of these. But when determined for one case, it will be calculable for all; because one definite *velocity* for the outflowing currents will always be the best, in every building alike; and knowing this velocity, we can, from the known hourly production of foul air (4 or 5 cubic feet per man or candle, and 12 or 15 per foot of lighting gas), reckon the collective area for all the ceiling-vents, and hence the size for each. The final outlets may be as large as we please; and the fresh-air inlets never less than the above area, nor than half a square inch per head, rather more per candle, and about thrice as much per foot of gas, per hour,* that the required quantities may be drawn in never faster than one mile per hour, an imperceptible draught; but it is best greatly to exceed these minima.

In public buildings, the ceiling pyramids or domelets will require neither the small size, large number, level arrangement, nor, in short, the *sameness* in any respect, of these domestic ones. Observe that the more people you have assembled, the *fewer* and *larger* may they be; because the abundance of respired air will give it volume and impetus enough to flow, without cooling, up a much longer slope than where it is in smaller quantity; thus bringing us to the somewhat paradoxical result, that the larger a place be, the fewer vents will it require,—the *fewer*, observe, not the *less* in area. In the Pantheon, *one* suffices, while in the small Alhambra baths there are several; and in the *still smaller* vestibule to them, having no bath, and no vapour to escape, there are many more,—no less than sixty-five.

We have, then, in a public assembling place, seven elements for variety in ceiling design. The components may vary in *form*, in size, in *best of base*, in *distribution* thereof, in *ornament of their surface*, of their separating members or *ribs*, and of their separating *vertical surfaces*, if on different levels. I mean that, fulfilling all the above sanitary requirements, we may still make each cavity of any size (between certain limit); with its base of any regular or pleasing figure; that base horizontal or inclined at any angle, to suit the roof slope, or the arched or dressed bearers; or at any height from the bases of adjoining cavities, and if less, separated from them by vertical surfaces, with any true decoration; or, if not, by ribs or bearers of any moulded profile or other decoration not interfering with their action as cut-currents; and, lastly, with *any* true surface decoration in the cavity itself—seven *ways*: whence it appears (to use Mr. Ruskin's mode of reckoning such things) that an infinitude of the seventh order will express the scope for variety that artists have in designing ceilings, without transgressing sanitary innocence,—without economising thought at the cost of their brothers' blood;—and thus I see no more reason why (even when limited by this condition) any two ceilings in Europe should be alike, than the Turks appear to see for, making theirs alike.*

* If these minima be startlingly less than the artificial ventilationists require, it must be remembered that with proper ceilings we only require the change of *an* mass air as *is actually used*; while they, to botch up matters with the flat ceilings, or whatever architects have left them, are obliged to allow for not only this amount, but an indefinite quantity besides, of *good air spoilt by admixture with foul*, and air used for what Dr. Arnott calls "*filtration of the foul air with fresh*." He might, consistently with this, propose filtration of sewage to serve again as drink. [Is not that what we really have in Thames water supplied to the metropolitan public?—Ed. B.]

* From "The Student's Guide to the Practice of Designing, Measuring, and Valuing Artificers' Works." Edited by E. L. Gwilt, Jun. Weale.

NOTES IN THE PROVINCES.

Eton.—In 1850, it may be recollected, a sum exceeding 8,000*l.*—part of a fund subscribed by old Etonians for the improvement of the college,—was expended in repairing the chapel. These repairs and improvements were confined to the choir. It has been resolved by the college authorities to expend between 2,000*l.* and 3,000*l.* more in renovating the ante-chapel. The work has now, according to the *Windsor and Eton Express*, been put into the hands of Mr. Rutter, of Cambridge, builder and carver, and the work begun. All the monuments in this part of the edifice have been removed from the walls, and, with the exception of those of the founder and Dr. Goodall, will be placed on the walls of the west entrance. The walls are to be refaced with Bath-stone, and new tracery panelling will be introduced along the whole of the west side, also new moulded purlins, cornices, and new moulding along the sides of arched principals, with carved angle ornaments to correspond with the new roofing of the choir; the arched beams and all the timbers of the roof to be coloured, the stone floor to be re worked and fixed. The old organ has just been taken away, and a new one placed in the choir.

Winchester.—The improvements at the Grand Jury Chamber, in this city, are progressing. The walls have been stripped of the first layer, or facing, of bricks, which is to be replaced with flints and stones, so as to resemble the County Hall adjoining. The windows and doors are to be converted into Tudor ones. The design is by Mr. O. B. Carter.

Eastnor.—The church at Eastnor, rebuilt by the patron, Earl Somers, except the chancel, erected by the rector, was reopened on Tuesday in last week. The workpeople engaged in the erection of the church, as well as the poor of the parish, were feasted, on the successful close of the work. The church, dedicated to St. John the Baptist, as rebuilt, consists of chancel, nave, tower, north aisle, and north chapel. With the exception of the tower, the whole has been rebuilt from the foundation, and a mortuary chapel added. The material used is a reddish gray sandstone from